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Morphoanatomy Studies of the Seed of *Lagonychium farctum* (Banks & Sol.) Bobr. Growing in Egypt

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Lagonychium farctum (Banks & Sol.) Bobr. is a wild plant growing in the deserts of Upper Egypt as a prickly perennial shrub with monopodial branches. It belongs to family Leguminosae. The plant is usually branching from the base and attains up to 2.5 m in height. It is used in traditional system of medicine as an astringent as well as anti-dysenteric. The present study investigates various standardized parameters such as macroscopic and microscopic characters which could be helpful in authentication of the seed of *Lagonychium farctum*. (Banks & Sol.) Bobr.

Keyword: *Lagonychium farctum*, Prosopis, Acacia, Mimosa, Leguminosae, Seed, Morphoanatomy Study

1. Introduction

Genus *Lagonychium* (Prosopis) includes 45 species (tropical and subtropical). *Lagonychium farctum* (Banks & Sol.) Bobr. belongs to family Leguminosae and sub-family Mimosoideae^[1-4]. This plant has many other synonyms as *L. stephaniiana* M. B., *Prosopis farcta* (Banks & Sol.) (Orth. Err. *farcata*), *P. stephaniiana* (Willd Kunth ex Spreng, *Acacia stephaniiana* (M. B.), *A. heterocarpa* Del., *Mimosa farcta* (Banks & Sol.) and *M. stephaniiana*^[2-6]. It is used in Palestine as an astringent and anti-dysenteric^[5]. Ingestion of large amount of this plant is toxic due to presence of saponins that cause inflammation to the digestive tract and quick peristalsis⁷. Sensor and motor nerve fibers are also affected in a serious way^[7]. It is an erect prickly trees or shrubs. Leaves: compound,

bipinnate. Stipules: small or absent. Leaflets: small, narrow. Stem: with or without spines. Spines solitary or in pairs. Flowers: pentamerous, usually sessile in narrow spikes, regular, actinomorphic, hermaphrodite. Calyx: five shortly toothed or subentire sepals. Corolla: five petals, valvate. Stamens: 10, free, short. Ovary: sessile or stalked, multi ovulate. Style: slender, filiform. Stigma: minute, terminal. Pod: turgid, cylindrical or oblong, straight, variously twisted, septa between the seeds. Mesocarp: thick and spongy. Seeds: usually ovoid compressed, albuminous^[8-10].



Fig .1: Picture of the fruit

2. Taxonomy:

Lagonychium farctum (Banks & Sol.) Bobr. belongs to^[2,11]:

Phylum	:	Angiospermae,
Subphylum	:	Dicotyledonae,
Class	:	Magnoliopsida,
Subclass	:	Rosidae,
Order	:	Fabales,
Family	:	Leguminosae,
Subfamily	:	Mimosoideae,
Genus	:	<i>Lagonychium</i> ,
Species	:	<i>farctum</i> (Banks & Sol.) Bobr.

3. Materials and Methods:

3.1 Plant Material: The seeds of *Lagonychium farctum* (Banks & Sol.) Bobr. were collected from sandy area around Kharga Oasis, Egypt, in June 1996. The sample was identified by Prof. A. Fayed (Professor of Systematic Botany and Taxonomy, Faculty of Science, Assiut University, Assiut, Egypt). It was dried at room temperature, then reduced to fine powder. The materials used for botanical study were taken from the samples preserved in 70% ethanol containing 5% glycerin.

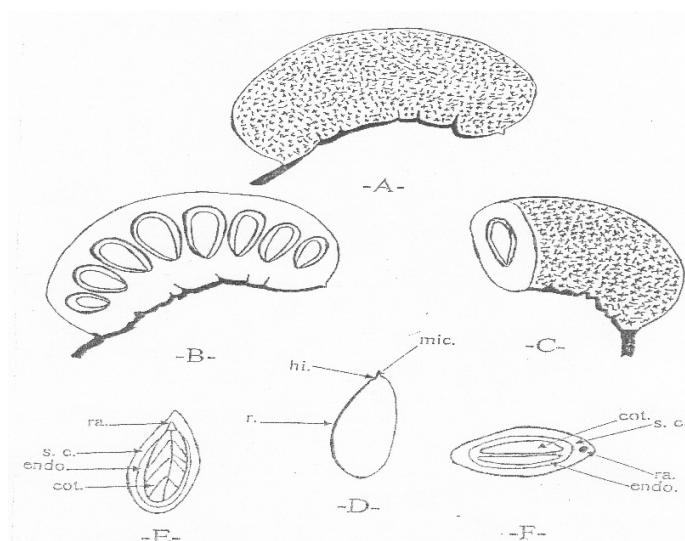


Fig .2: Morphology of the fruit and seed; A. the whole fruit, B. Longitudinal section of the fruit, C. Transverse section of the fruit, D. The whole seed, E. Longitudinal section of the seed and F. Transverse section of the seed.(All X 2)

3.2 Microscopic studies:

Transverse sections as well as powder of the seed were used for observation of various microscopic features.

4. Results and Discussion

4.1 Macroscopical Characters:

The Seed (Fig. 2):

The fruit breaks transversely into one-seeded segments and contains up to 10 seeds. It is oval, flattened having a shiny, smooth surface and both sides are convex. It has a narrow or somewhat frequently pointed end at which the hilum and micropyle are situated in a shallow depression and another rounded broad one. The raphe is running from the micropylar end along the seed on one of its edges. The seed arises from anatropous ovule. A transverse and differently directed longitudinal cuts show two planoconvex, yellowish, fleshy, flattened cotyledons which are surrounded by whitish endosperm and a thick seed coat. The embryo is straight, composed of two large cotyledons and a cylindrical short radicle directed towards the micropyle. The seed is albuminous. 100 seeds weigh from 8 to 14 g. The seeds measure from 8 to 15 mm in length, 4 to 7 mm in width and 2 to 5 mm in thickness. They vary in colour from dark brown in fully ripe seeds to a whitish green in the unripe ones, with faint characteristic odour and slight bitter, astringent mucilaginous taste.

4.2 Microscopical characters of the Seed:

The Seed (Fig. 3 and 4):

The seed is more or less oval in cross section. The testa shows an outer epidermis accompanied with a hypodermal layer. The latter consists of about 15 to 20 rows of thin walled parenchyma which is followed internally by about 10 to 13 rows of thin walled and collapsed cells forming a hyaline layer. The endosperm is narrow and mucilaginous followed internally by the oily dicotyledonous embryo.

A-Testa:

1-The epidermis (Fig. 3 and 4A-C):

It is formed of one row of radially elongated cells as seen in the transverse section. The cells are closely packed showing no intercellular spaces. They have unevenly thickened striated cellulosic walls and narrow to somewhat wide lumina forming a palisade like layer. Therefore, refraction line appears due to the difference in thickness. They are covered with smooth and thick cuticle. In surface view (Fig. 7C, D, 8B, C): The cells appear very small, polygonal, mostly isodiametric with straight anticlinal walls and narrow (outer 2/3 part of the epidermis) or wide (inner 1/3 of epidermis) radiating lumina. They measure from 90 to 100 to 110 μ in length and 6 to 10 to 14 μ in width.

2-The Hypodermis (Fig. 3A, 3B and 4D):

It is formed of nearly oval to rounded cells as seen in transverse section. They have thin cellulosic walls, narrow intercellular spaces and contain brown tannin bodies which stain olive green with ferric chloride T.S. They measure from 14 to 16 to 24 μ in diameter.

3-The hyaline later (Fig. 3A and 3B):

It is formed of collapsed cells with thin cellulosic walls and free from contents.

B-The endosperm (Fig. 3A, 3B and 4E):

It is formed of isodiametric, usually hexagonal cells with thin cellulosic walls with rare intercellular spaces. They contain neutral mucilage which stains blue with methylene blue. They measure from 14 to 22 to 28 μ in diameter.

C-The Embryo (Fig. 3A, 3B and 4F):

The cells of the cotyledons are surrounded by outer epidermis formed of parenchymatous square or tabular cells. They enclose parenchymatous palisade like cells. The embryo contains granular protein contents which stain yellow with picric acid and fixed oil globules which stain red with sudsan III. The outer cells measure from 22 to 31 to 40 μ in diameter and

the inner one measures from 40 to 48 to 56 μ in length and 6 to 8 to 10 μ in width.

D-The Powdered Seed (Fig. 4):

It is pale yellowish-brown in colour with faint characteristic odour and slight bitter astringent mucilaginous taste. Microscopically, it is characterized by the following:

1. Fragments of epidermis which appear in side, top or basal views. In side view they are elongated, closely packed showing no intercellular spaces, having unevenly, thickened, striated, cellulosic walls, narrow to somewhat wide lumina and covered with smooth and thick cuticle. Top or basal view, they appear small polygonal, mostly isodiametric with straight anticinal walls, narrow (top view) or wide (basal view) radiating lumina.
2. Numerous scattered cells from the hypodermis which are oval or rounded in

shape with thin cellulosic walls, narrow intercellular spaces and contain brown tannin bodies which stain olive green with ferric chloride T.S.

3. Few fragments of endosperm which appear as isodiametric, usually hexagonal cells with thin cellulosic walls with rare intercellular spaces. They contain neutral mucilage which stain blue with methylene blue.
4. Fragments from the embryo showing parenchymatous palisade like cells. They contain granular protein contents which stain yellow with picric acid and fixed oil globules which stain red with sudan III.
5. Few spiral and annular lignified xylem vessels from the vascular bundle of the raphe.
6. Absence of stone cells or hairs.

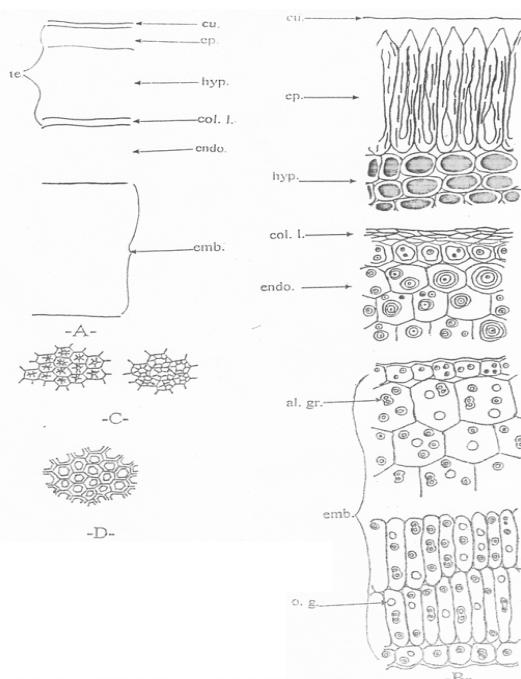


Fig .3 : The seed; **A.** Diagrammatic transverse section, **B.** Detailed transverse section, **C.** Top view of the epidermis and **D.** Basal view of the epidermis (A X 125 and B, C, D X 50)

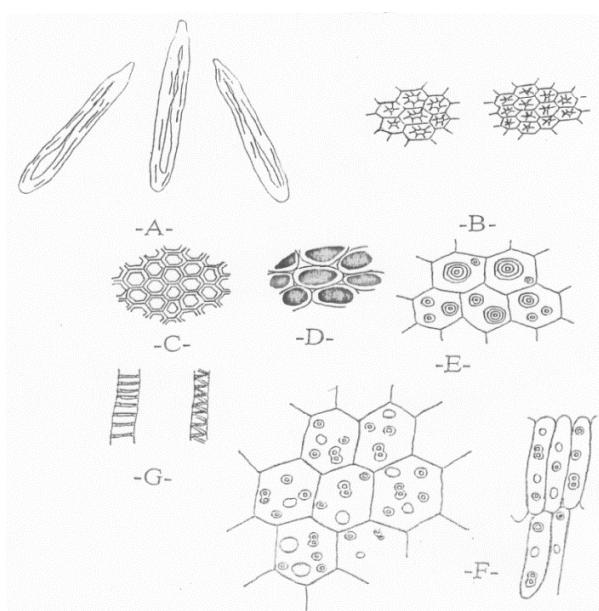


Fig .4: The seed powder; **A.** Side view of the epidermis, **B.** Basal view of the epidermis, **C.** Top view of the epidermis, **D.** Hypodermis, **E.** Endosperm, **F.** Embryo and **G.** Raphe xylem vessels (All X 500)

5. Conclusion

From the present study, the microscopic studies on the seed of *Lagonychium farctum* (Banks & Sol.) Bobr. can assist as a relevant source of information and contribute towards the standards to dispose the quality and identity of this plant in future exploration.

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